REALmagic®
Netstream™ 4000

MPEG-4 Video Display Over Networks

User's Guide

SIGMA DESIGNS®

© 2002 Sigma Designs Inc. All Rights Reserved.

November 2002

Information in this manual is subject to change without notice. The software described in this manual is furnished under license and may be used or copied only in accordance with the license agreement. It is unlawful to copy the software except as specified in the license agreement. No part of this manual may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying or scanning, for any purpose, without the express written permission of Sigma Designs, Inc.

REALmagic, REALmagic NetStream 4000, REAL Overlay are trademarks of Sigma Designs, Inc. Sigma Designs and the Sigma Designs logo are registered trademarks of Sigma Designs, Inc. Microsoft and MS are registered trademarks of Microsoft Corporation. As used in this manual, Windows refers to Microsoft Windows, Microsoft Corporation's implementation of a windowing system. PC and VGA are trademarks of International Business Machines Corporation. All other brand and product names referred to in this manual are trademarks or registered trademarks of their respective holders.

Please address comments or questions to:
Sigma Designs, Inc.
Customer Service Center
1221 California Circle
Milpitas, CA95035 USA

Phone: (408) 957-9866

Fax: (408) 957-9740

Internet: tech_support@sdesigns.com

World Wide Web: www.sigmadesigns.com

Sigma Designs, Inc., reserves the right to use or distribute any information you supply to its Customer Service Center in any way it deems appropriate without incurring any obligation whatsoever.

FCC Compliance Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Notice

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Shielded cables and I/O cords must be used for this equipment to comply with the relevant FCC regulations.

Changes or modifications not expressly approved in writing by Sigma Designs, Inc., may void the user’s authority to operate this equipment.

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the radio interference regulation of the Canadian Department of Communication.

Table of Contents

FCC Compliance Statement 4
Notice 4
Table of Contents 5
Introduction 7
Hardware Features 7
Software Features 7
Audio Features 8
Video Features 8
MPEG support capabilities 8
MPEG-1 8
MPEG-2 8
MPEG-4 8
NTSC/PAL Television Output of MPEG Video (MPEG-only TV output) 8
Resizable VGA Video Windows 8
System Requirements 9
External Connectors 9
Internal Connectors 9
Technology Overview 10
MPEG-1, MPEG-2, and MPEG-4 10
DVD 10
Dolby Digital Surround Sound 10
Dolby Pro Logic Surround Sound 10
Supported File Formats 11
MPG Files 11
DAT Files (Video CD 1.0 and 2.0) 11
VBS and ABS Files 11
Transport and Program Streams 11
Handling the Board 12
Hardware Installation 12
Installing the Hardware 13
Video Connection 14
Audio Connections 14
TV Connections 14
Advanced Connections 15
Macrovision Copyright Notice 16
Software Installation for Windows 98SE/Me/2000/XP 17
Software Installation 17
Border Adjustment and Color Calibration 17
Setting and Changing the DVD Region Code 19
DVD Region Codes 19
Overview 20
Xmedia player Software 20
Customizable Advanced Information Panels 20
Status Information 20
Playlist Manager 20
Starting Xmedia player 22

Using Xmedia player **22**
Main Panel *23*
Volume control 23
Standard buttons 24
Navigation Panel *25*
Keypad Panel *26*
Advanced Panel *27*
Configuration Window 28
DVD options 28
Rating Control *29*
Preferred Display Modes *29*
Video setup 29
Video Standards *29*
Video Outputs *30*
Video adjustment 30
Audio Output 31
Analog/PCM *31*
Compressed S/PDIF *31*
VCD channel output *31*
General Settings 31
Tooltips *31*
AutoPlay *31*
Shortcut Keys *32*
DVD Menu Shortcut Keys *32*
Windows Media Player and DirectShow Support **33**
Manual Color Calibration *35*
Advanced Color Adjustments *35*
Advanced Configuration Options **35**
Border Adjustments *36*
Customer Service **37**
Appendix **38**
Output specifications *38*
Audio 38
Video 38
Power specifications *39*

Chapter 1: Introduction

Congratulations on purchasing your new NetStream 4000. The NetStream 4000 is a PCI-based add-in card that provides high performance MPEG-1, MPEG-2, and MPEG-4 decoding to play streaming video or DVD titles on mainstream PCs. Based on our award-winning REALmagic Video Streaming Technology, the NetStream 4000 delivers premium audio and video experiences, and supports advanced video overlay technology and progressive VGA video ouput. NetStream 4000 provides an ideal PC-based solution for advanced video-on-demand and streaming video applications where internet and computer applications are also part of the TV-based client.

Hardware Features

- Sigma Designs EM8470 MPEG-1/2/4 audio/video decoder
- Sigma Designs EM9010 analog overlay chip
- Sigma Designs EM9038 analog multiplexer and digital-to-analog converter chip
- 4MB SDRAM
- Supports both 3.3 and 5.0 volt PCI slots
- Composite, s-video, component YPbPr video output
- Non-interlaced analog overlay of MPEG in VGA window display
- Non-interlaced, fullscreen progressive RGB 480p and 720p output via VGA connector
- Video-in-a-window on the VGA monitor

Software Features

Features include:

- ISMA compliant (VOD client software supports MPEG-4 streaming)
- Onscreen display with flicker filter
- SDKs for Windows (DirectShow)

Contact Sigma Designs for additional details.

Audio Features

- Decodes Dolby® Digital 5.1 channel audio in hardware with Dolby Surround (ProLogic) downmix
- Passes compressed DTS®, Dolby Digital and PCM audio via S/PDIF
- Outputs S/PDIF (PCM only) and 3.5mm stereo audio simultaneously
- Decodes MPEG–1 and -2 audio with stereo playback
- Outputs 16-bit, 20-bit and 24-bit stereo audio
- Supports sampling rates of 32KHz, 44.1KHz, and 48KHz (96KHz is downsampled to 48KHz)
- Supports audio data rates up to 384Kbits/sec

Video Features

MPEG support capabilities

NetStream 4000 supports MPEG-1 (ISO 11172) MPEG-2 (ISO 13818) and MPEG-4 (ISO 14496). Specifics are listed below.

MPEG-1

- Decodes MPEG-1 audio and video system streams
- Supports SIF resolution streams
- Supports both NTSC and PAL formats
- Supports resolutions up to 352x288

MPEG-2

- Decodes program, transport and PES streams
- Supports MP@ML

MPEG-4

- Supports Advanced Simple Profile, Level 5 (no global motion compensation or quarter pixel support)
- Supports resolutions up to 720x576

NTSC/PAL Television Output of MPEG Video (MPEG-only TV output)

- Full-frame, 4:2:2 10-bit television output in NTSC or PAL format, independent of VGA window size
- Standard, overscan display
- Scaling for DVD-Video in pan and scan and widescreen (letterbox) modes
- Configuration utility included in Xmedia player to match MPEG output resolution and frame rate to the attached television set (NTSC 60, PAL 50 (Standard), PAL 60, Multi System, PAL-M)
- Brightness, contrast and color saturation controls

Resizable VGA Video Windows

- Compatible with virtually all VGA cards at 640x480 to 1600x1200 resolution
- Supports full-screen and windowed playback
- Up to 120Hz VGA refresh rate supported

- Fully resizable VGA video windows from thumbnail to full screen 1600x1200 video window
- MPEG video displays on VGA screen in 24-bit color, regardless of VGA adapter color setting
- Hardware X-Y scalar automatically anti-aliases, filters and smoothes video for sharp playback at any window size
- Automatically displays progressive MPEG content in non-interlaced mode of 720x480p

---

System Requirements

The NetStream 4000 requires the following:

- Microsoft Windows 98SE, Me, 2000, or XP
- 266MHz or higher x86-compatible CPU
- PCI 2.1 compliant expansion slot (both 3.3V and 5V slots)
- Plug and Play BIOS support
- 32MB RAM and 2MB of free hard disk space
- DVD-ROM drive required for DVD-Video playback
- Bus Mastering IDE controller recommended for DVD-ROM playback
- PCI Network adapter recommended for networked video playback
- External stereo speakers required for stereo audio playback
- Dolby ProLogic receiver/amplifier and surround speakers required for Dolby ProLogic surround sound
- Dolby Digital amplifier with S/PDIF input and surround speakers required for Dolby Digital 5.1 channel surround sound

Note: Specific applications and network configurations may require additional memory, specialized network adapter cards, and/or faster CPU speeds.

External Connectors

- 3.5mm stereo audio output
- S/PDIF output
- S-video output
- Composite (RCA) video output
- Component (YPbPr) video output (via three RCA connector/splitter attached to S-Video connector)
- VGA output
- VGA input

Internal Connectors

- DVD or CD-ROM drive analog Audio Input 1 (audio CD)
- DVD or CD-ROM drive analog Audio Input 2 (audio CD)
- DVD or CD-ROM drive S/PDIF Audio Input (audio CD & DTS audio CD)
- Line audio output

Technology Overview

MPEG-1, MPEG-2, and MPEG-4

MPEG stands for Moving Picture Experts Group. It refers to a method of data compression optimized for video and audio data. By analyzing the changes between video "frames," an MPEG "encoder" is able to reduce the file size of the compressed video data significantly.

This remarkably efficient compression method allows fullscreen and full-motion video, plus CD-quality audio to be stored in a relatively small size file. Once the data has been compressed, however, it must be "de"-compressed before it can be used.

Your NetStream 4000 incorporates specialized hardware to decompress MPEG data at a very high speed, which allows MPEG "streams" to play back at a data transfer rate of 500 Kilobits (Kb) to up to 15 Megabits (Mb) per second. MPEG-2 video has a resolution of 720 x 480 in 24-bit (16.8 million) colors at 30 frames per second (fps). MPEG-1 video has a resolution of 352 x 240 in 24-bit (16.8 million) colors at 30 fps. The MPEG standard is a fully open standard and has been embraced by the computer and entertainment communities as the current standard of digital video on both television and personal computers.

MPEG-4 is a graphics and video compression algorithm standard that is based on MPEG-1 and MPEG-2 and Apple QuickTime technology. Wavelet-based MPEG-4 files are smaller than JPEG or QuickTime files, so they are designed to transmit video and images over a narrower bandwidth and can mix video with text, graphics and 2-D and 3-D animation layers. MPEG-4 was standardized in October 1998 in the ISO/IEC document 14496. MPEG-4 files supported by the NetStream 4000 include Advanced Simple Profile (without GMC and QPEL) and ISMA Profile 0.

DVD

DVD is a revolutionary storage medium that is currently capable of storing up to 18 gigabytes (GB) of data on a disc the size of a standard CD. This is enough to store an entire movie encoded in the MPEG-2 format on a single side of the disc.

Dolby Digital Surround Sound

Some MPEG-2 video uses Dolby Digital Surround Sound. Dolby Digital Surround Sound incorporates six discrete digital audio channels to provide a full immersion surround sound system that is similar to that of a movie theatre. The six channels include left and right front, left and right back, center, and subwoofer.

The NetStream 4000 can output the six discrete channels of Dolby Digital audio using the S/PDIF connection. Also, it converts the six channels into Dolby Pro Logic Surround Sound, which is carried using a standard 1/8" (3.5mm) stereo connector. This lets you play the Dolby Digital sound using either standard stereo speakers or using a Dolby Pro Logic amplifier with surround sound speakers.

Dolby Pro Logic Surround Sound

Dolby Pro Logic Surround Sound uses the standard analog stereo signal to multiplex surround sound information, and requires a Dolby Pro Logic receiver/amplifier to decode the signal. Pro Logic Surround Sound differs from Dolby Digital Surround Sound by using the same audio signals for both the front and back speakers on the left and right channels.

Supported File Formats

Your NetStream 4000 supports the following MPEG file formats:

MPG Files

MPG is the extension used for files with MPEG-2 or MPEG-1 compressed full-motion video. For MPEG-2, the video resolution is 720 x 480 at 30 frames per second (fps) with 16.8 million colors (full CCIR601). For MPEG-1, the video resolution is 16.8 million colors at 352 x 240, shown at 24, 25, or 30 fps. Both MPEG-2 and MPEG-1 files may include MPEG-compressed audio (16-bit, 48kHz stereo sound). The NetStream 4000 also supports the Half-D1 and 2/3 D1 formats of MPEG-2.

DAT Files (Video CD 1.0 and 2.0)

DAT is the extension for Video CD or Karaoke CD files. The NetStream 4000 can play both Video CD and Karaoke CD DAT files.

VBS and ABS Files

VBS and ABS are file extensions used for some MPEG-1 encoded video-only bit stream and audio-only bit stream files.

Transport and Program Streams

NetStream 4000 supports MPEG-2 files on both transport and program stream formats. It is possible to select the PID'S from a transport stream, in order to choose a different audio or video stream.

Chapter 2: Hardware Installation

This chapter describes installation procedures for the NetStream 4000.

Handling the Board

Warning: Static electricity can damage your equipment. Do not take the board out of its static protective bag until you are ready to work with it.

Follow these precautions when handling the board:

- Before you open the static protective bag, touch it to a metal expansion slot cover on the back of your computer. This drains static electricity from the package and from your body.
- Do not touch any exposed printed circuitry after opening the package.
- Keep other people from touching the board. They might have a static-electricity buildup.
- Limit your movement. Movement causes a buildup of static electricity.

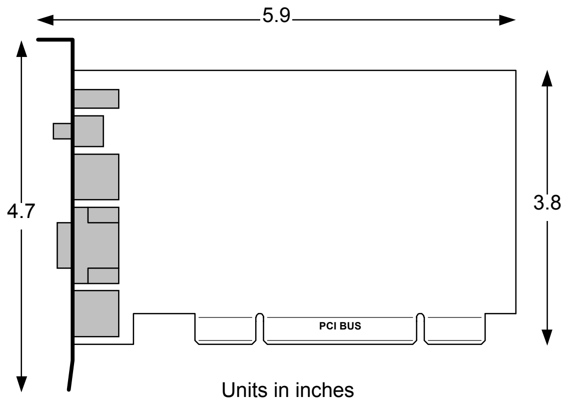


Figure 1. NetStream 4000 board dimensions.

Installing the Hardware

Follow the steps below to install the NetStream 4000 into your computer.

1. Turn off the power to the computer and to the VGA monitor. Unplug (disconnect) the power cord from the computer.
2. Disconnect the VGA monitor cable from your PC.
3. Remove the cover from the computer. (Refer to your PC user's manual for specific instructions.)
4. Locate an available PCI expansion slot. (The NetStream 4000 will not fit into an ISA slot.)
5. Remove the slot cover screw and slot cover, if applicable.
6. Open the protective sleeve containing the NetStream 4000, grasp the circuit board by the edge of its mounting bracket, and remove it from the protective sleeve.
7. Insert the NetStream 4000 into the PCI expansion slot. Press down gently on the top edges of the board to ensure that all connecting points are seated securely. Anchor the board's mounting bracket using the screw removed earlier.
8. Replace the cover of your PC and reconnect the power cord.

Note: If you install a DVD-ROM drive at the same time as the NetStream 4000, remember to attach the CD-Audio cable from the DVD-ROM drive to your sound card. Otherwise, you will not be able to play CD-Audio titles with the DVD-ROM drive. This will not affect the audio of DVD-ROM titles.

Note: NetStream 4000 requires a bus-mastered PCI slot. Most PCI slots support PCI bus mastering, but if you experience difficulties with your NetStream 4000, you may wish to relocate the card to a different PCI slot.

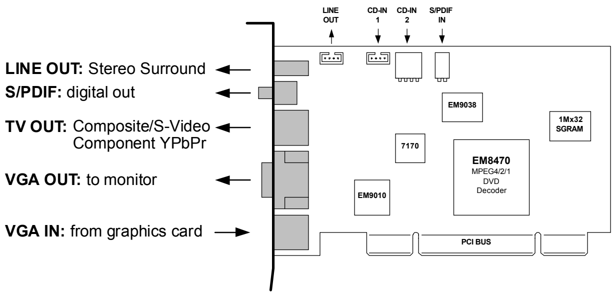

LINE OUT
CD-IN 1
CD-IN 2
S/PDIF IN
LINE OUT: Stereo Surround
S/PDIF: digital out
TV OUT: Composite/S-Video Component YPbPr
VGA OUT: to monitor
VGA IN: from graphics card
EM9038
1Mx32 SGRAM
7170
EM8470 MPEG4/2/1 DVD Decoder
EM9010
PCI BUS

Figure 2. NetStream 4000 connections.

Video Connection

Your NetStream 4000 must be connected to your VGA card or your PC's VGA output port in order to display MPEG video on your VGA monitor. (Refer to Figure 2.) .

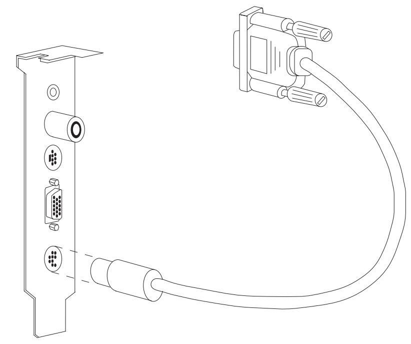


Figure 3. NetStream 4000 VGA connection.

1. Attach the round 9-pin DIN connector of the provided external VGA pass-through cable to the VGA IN connector at the back of the NetStream 4000 (refer to Figure 3).
2. Attach the other end (15-pin "D" shape) of the cable to the output port on your VGA card or your PC's VGA output port.
3. Connect the VGA cable from your VGA monitor to the VGA OUT of the NetStream 4000.

Audio Connections

The NetStream 4000 has a standard 1/8-inch (3.5mm) Stereo Output Port. The Stereo Output Port outputs a standard analog stereo signal that can be used by virtually any stereo receiver or amplified speakers. It also contains the Pro Logic Surround Sound encoding that allows you to achieve surround sound by attaching a Pro Logic receiver.

If your system has a sound card, we recommend attaching the Stereo Output signal to the LINE-IN port on your sound card, and then attaching your receiver or amplified speakers to the LINE-OUT or SPEAKER port on your sound card. This will allow you to use one set of speakers to listen to both MPEG-2 audio as well as other types of audio from your sound card. It will also allow you to control the volume by using the mixer program provided with your sound card. Otherwise, attach this signal directly to your receiver or amplified speakers.

TV Connections

There are three options for connecting your REALmagic NetStream 4000 DVD/MPEG-1,-2,-4 Playback Card to a television: direct S-Video output, composite video using an SVideo to Composite cable, or RGB/ YPbPr output using an S-Video to Component cable.

The REALmagic NetStream 4000 DVD/MPEG-1,-2,-4 Playback card can be connected directly to a TV using a S-Video cable. The S-Video TV Out connector on the REALmagic NetStream 4000 is a 7-pin S-Video connector, which can be connected directly to a TV using a standard 4-pin S-Video cable. If your television set does not have an S-

Video input port, you may connect it to the REALmagic NetStream 4000 by using an S-Video to Composite adapter cable.

Composite Video is more common and works with most televisions. The S-Video Out connector provides better picture quality.

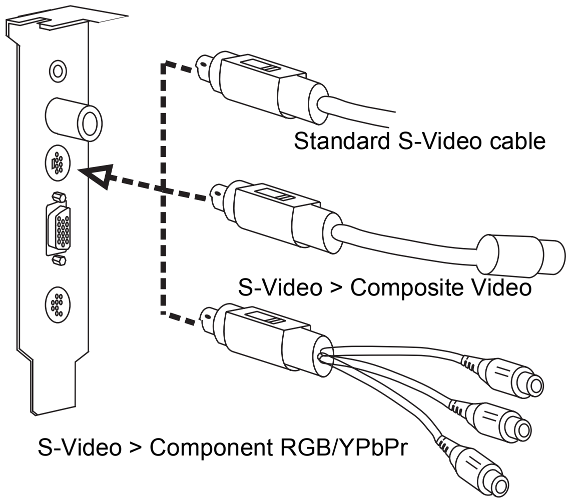


Figure 4. NetStream 4000 S-Video (and adapter) cables.

The component video output cable, available separately, can also be plugged into the S-Video port. With this cable attached, NetStream 4000 can display NTSC and PAL video in the component RGB and YPbPr formats. A software utility described in the next chapter enables the selection of RGB and YPbPr modes.

Note: This connection will not pass any audio to your TV set.Check audio connections.

Advanced Connections

The NetStream 4000 also includes an internal CD Audio In connector that allows you to pass MPEG audio through to the internal CD Audio In connector on your sound card. To do this, attach the CD Audio cable from your CD-ROM or DVD-ROM drive to the NetStream 4000, then attach another cable from the NetStream 4000's internal Line Out port the to the CD Audio In connector on your sound card. Please refer to Figure 2 for the locations of these internal connectors.

The signal from the Line Out port combines the CD Audio In signal from the CD-ROM or DVD-ROM drive with the same signal that is output through the Stereo Output Port on the NetStream 4000. This solution eliminates the external audio cable that normally goes from the NetStream 4000 to your sound card.

If you are using this solution, attach your receiver or amplified speakers to the Line Out port of your sound card to obtain the audio sound signal.

Note: With this solution, the volume for both CD audio and MPEG audio will be controlled by the CD Audio portion of your mixer.

Note: For the best playback quality, make sure the NetStream 4000 is connected directly to a TV, not through a VCR.

Macrovision Copyright Notice

This product incorporates copyright protection technology that is protected by method claims of certain U.S. patents and other intellectual property rights owned by Macrovision Corporation and other rights owners. Use of this copyright protection technology must be authorized by Macrovision Corporation, and is intended for home and other limited viewing uses only, unless otherwise authorized by Macrovision Corporation. Reverse engineering or disassembly is prohibited.

Chapter 3: Software Installation

This chapter describes the software installation procedure for the NetStream 4000. Please follow the directions carefully. Skipping steps may result in improper operation.

Note: Please make sure you have DirectX/DirectShow installed before installing this software. Otherwise the video streaming may not be available. (*Depending on your video client software*)

Software Installation for Windows 98SE/Me/2000/XP

1. After installing NetStream 4000 and making all appropriate hardware connections, turn on the power to your computer. The Plug and Play feature of NetStream 4000, if properly detected by Windows 98SE/Me/2000/XP will display the message **New Hardware Found** along with the NetStream 4000 signature during boot-up.
   Note: For Windows XP, use the Windows 2000 drivers and applications.
2. When the **New Hardware Found** message appears, choose the option ***Driver from disk provided by hardware manufacturer*** and then click *OK*.
3. The **Install From Disk** dialog appears. Insert the NetStream 4000 CD into your CD- or DVD-ROM drive.
4. Make sure the dialog specifies the correct disk drive letter (for example, D:\ ) and location (use the Browse dialog), and click *OK* to install the appropriate drivers and software for the NetStream 4000 to your hard disk. For example, installing to Windows 98SE might use the driver location D:\NetStream 4000\Drivers\Win98SE_Me.
5. When the installation is complete, the Windows desktop will appear.
6. Run **Setup** from the NetStream 4000 CD. After installing the applications corresponding to your operating system (see step 4), Setup will run Auto Calibration to adjust borders and colors. For finer adjustments, see User's Guide, "Border Adjustment and Color Calibration" on page 3 on the supplied CD.

Note: You may have to run Setup a second time to assign your DVD movie region code if you are not using a RPC2 DVD-ROM drive. See "Setting and Changing the DVD Region Code."

Border Adjustment and Color Calibration

Set Border Adjustment and Color Calibration once for each display setting (resolution, number of colors, and refresh rate):

1. After rebooting, start the **REALmagic® Configuration Utility**. From the ***Start*** menu in the Taskbar, navigate to

Programs>REALmagic NetStream>REALmagic Configuration to open the **REALmagic Configuration…** dialog (See Figure 4).

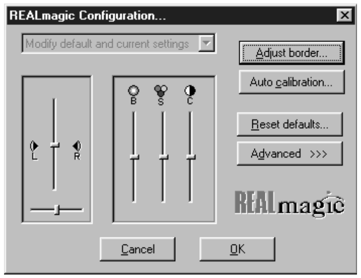
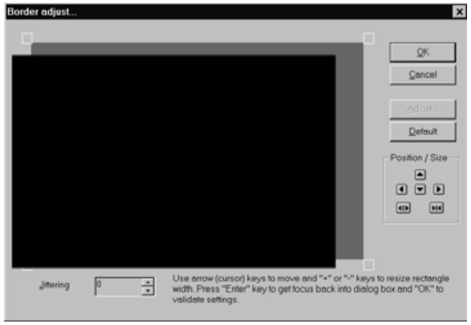


Figure 5. REALmagic® Configuration

2. Click *Auto Calibration*, and then click *OK*. As the software automatically calibrates, screen colors may flicker.
3. If the auto calibration function fails, reboot your system and try again. If it fails again, perform a manual color calibration. See User's Guide, Appendix A. Advanced Configuration Options, page 39 on the supplied CD. If the auto calibration function continues to fail, right-click on the Desktop and use the Display Control Panel to make sure that the monitor refresh rate is set to 72 Hz or lower.
4. If further fine border adjustments are required, click *Adjust border…*
5. Click the directional arrow in the **Border Adjust** dialog (See Figure 5) or use the arrow keys on your keyboard to align the four corners of the colored window within the gray outlined pink window. Click ◀||▶ or press the plus (+) key on the keyboard to widen the colored window. Click ▶||◀ or press the minus (−) key on the keyboard to make the colored window narrower. Click *OK* to accept any changes.



Use arrow (cursor) keys to move and "+" or "-" keys to resize rectangle width. Press "Enter" key to get focus back into dialog box and "OK" to validate settings.

Figure 6. Border Adjust

6. The *Reset Defaults* button sets the color calibration and the border adjustment values to factory default settings.

Setting and Changing the DVD Region Code

Use the setup program to change the DVD region code of the board if you relocate to a different region or want to play DVDs with different region codes. **The region code may only be changed five times.**

Follow these instructions to set and change the DVD region code:

Note: You will NOT need to set a region code for NetStream 4000 if you are using a DVD-ROM drive that carries the region code (RPC2 drive).

1. Insert the REALmagic® CD into your CD or DVD drive. From the ***Start*** menu on the Taskbar, navigate to ***Run…*** , type `D:\SETUP` (or substitute your correct CD/DVD drive letter, and click *OK*.
2. Check *Change the DVD Region Code* and click *OK*.
3. Select the DVD region code appropriate to the DVD being viewed. Follow the on-screen instructions to complete region code set-up.

DVD Region Codes

Regionalization and Copy Protection (DVD Region Code) uses the Content Scramble System (CSS) standard to prevent unauthorized duplication of the intellectual property distributed on DVDs. The Motion Picture Association of America (MPAA) originally requested it to address video piracy, but it is applicable to any content. CSS inhibits the transmission of unencrypted data over the PCI bus. Playback systems must license CSS to decode the encrypted data.

The CSS specification divides the world into six unique regions. Content designated for one region can only be played by systems of that region.

While CSS is used to prevent digital copies of the DVD content, another technology, Macrovision, was devised to prevent analog copies of DVD content. Macrovision is a scrambling system widely used by the movie industry to prevent unauthorized duplication of video content using commercial VCRs.

DVD playback systems must support both CSS and Macrovision copy protection standards.

Chapter 4: Xmedia player Software

Overview

Xmedia player provides a completely new interface for Sigma Designs DVD, DivX™ Video, Video CD, audio CD and computer audio/media file playback under Windows. Xmedia player plays full-length feature films recorded on DVD (drive must be DVD-compliant), DivX™ Video, Video CD, and data CDs (MPEG files), as well as audio CDs. Xmedia player can automatically detect, identify, and play audio/video information from discs in your CD or DVD drives, or from a specified location on your hard drive.

Xmedia player automatically detects the volume type loaded; customizable advanced panels provide information relevant to the detected volume type. Possible volume types include:

- DVD
- VCD/VCD 2.0
- SVCD
- Audio CD
- Computer-based file directories

Customizable Advanced Information Panels

Xmedia player hides and displays panels for Playlist Management, DVD Navigation, VCD Keypad, and Advanced Configuration.

Status Information

The new Xmedia player software provides a wide range of status information.

- Disc/file type - format of the file being played (DVD, DivX™ Video, VCD/VCD 2.0, Audio CD, AVI, MPG, etc.)
- Volume/file name - the actual name of the file being played
- Time progress - a counter showing time elapsed since the current file/track began playing
- Play state - current operating status of the file (playing, paused, stopped)
- Loop indicator - current loop option activated (none, track repeat, playlist repeat)

Playlist Manager

Xmedia player’s playlist manager includes drag-and-drop capability, as well as standard open file dialog directory browsing. With the playlist manager, you can:

- Add files to the playlist (DivX™ Video clips, MPEG-1, MPEG-2, MPEG-4, MP3 audio). Xmedia player displays the name and duration of each file in the playlist.
- Remove one, some or all files from a playlist (either left-click and press *Delete* on your keyboard, or right-click and select *Delete* from the pop-up menu.)
- Reorganize files within a playlist.
- Save playlists for future enjoyment.
- Load playlists from the hard drive. Xmedia player recalls and restores its last state each time it runs.

Chapter 5: Using Xmedia player

Starting Xmedia player

1. Start Windows, if you have not already done so.
2. Place a DVD disc, a Video CD, or a CD-ROM containing MPEG files in your DVD drive.
3. From the ***Start*** menu in the Taskbar, navigate to ***Programs>REALmagic>***Xmedia player. The Xmedia player (Figure 7) will appear on the screen. Xmedia player looks best if Windows is set to High Color (16-bit) or better.
4. Xmedia player automatically plays discs inserted into the DVD-ROM drive if Autoplay is enabled. To access the Autoplay toggle, left-click on the *Configuration* button and select the *General* tab.

When viewing video on a TV(default viewing option), the VGA screen displays the Xmedia player interface and operating system desktop.

When viewing video on a VGA display, the Xmedia player interface disappears after the Play button is pressed allowing the video to occupy the entire screen. Press the ESC key or doubleclick the mouse to restore the Windows desktop and redirect video output to the TV, if present.

The entire interface of Xmedia player may be completely user-defined (skinnable). Future software development kits will provide information on developing customizable interfaces/skins.

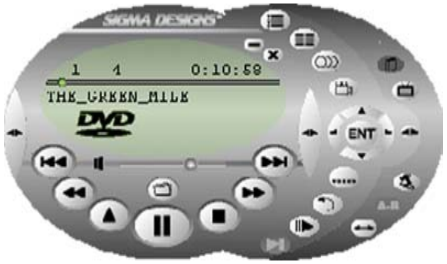


Figure 7. Xmedia player interface for DVD playback.

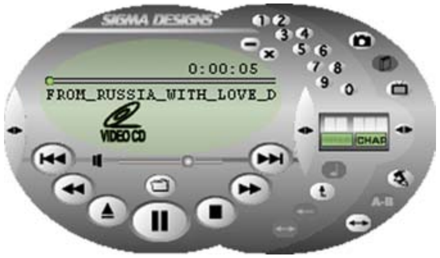


Figure 8. Xmedia player interface for VCD playback.

Main Panel

The Main Panel (Figure 9) provides specific information about the current video or audio track, such as its track number, and play time. A **Progress Bar**, positioned directly above the file/volume title, indicates the progression of the clip as it plays. Click anywhere along the **Progress Bar** to jump to a particular part of the track being played. Depending on the type of disc playing, additional information may appear.

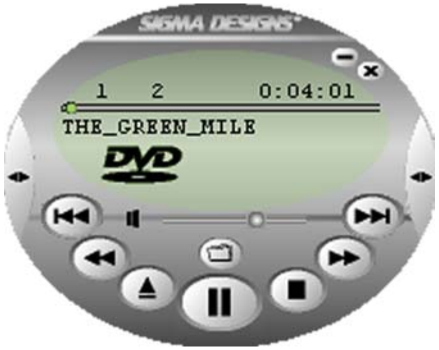


Figure 9. Main panel.

Volume control

Adjust the Volume Control (Figure 10) by dragging the knob left (to lower volume) and right (to increase volume). Click the speaker icon to toggle audio on/off. A red line crosses the icon to indicate that mute is active.

Figure 10. Volume control.

Standard buttons

Xmedia player has controls similar to those of a VCR (Figure 9).

Left-click the *Play/Pause* button to begin playing the file list, to pause play, or to resume play after pausing. *Right-click this button to select between the defined DVD drive and hard disk directory/file list options.*

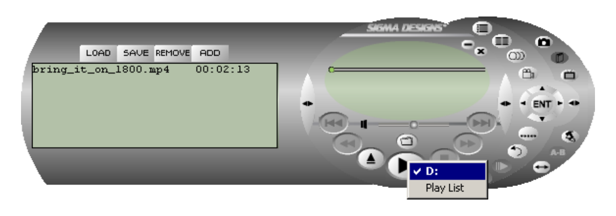


Figure 11. Play menu.

Click the *Stop* button to stop playback and reset the track pointer to the beginning of the file list.

Click the *Eject* button to eject or close the CD/DVD drive mechanism (if supported by your CD or DVD-ROM drive).

Left-click the *Rewind* button to play the current DVD track backwards at 2x normal speed. Subsequent clicks cycle through 4x, 8x, and then back to normal speed. For VCDs and media files on the hard drive, each left-click implements a 10-second jump backwards. *Right-click this button to bring up a menu of available rewind speeds.*

Left-click the *Fast Forward* button to fast forward the current DVD at 2x normal speed. Subsequent clicks cycle through 4x, 8x, and then back to normal speed. For VCDs and media files on the hard drive, each left-click implements a 10-second jump forwards. *Right-click this button to bring up a menu of available fast forward speeds.*

Click the *Previous Track* button to skip to the previous track.

Click the *Next Track* button to skip to the next track.

Click the *Open File* button to access MPEG files on the hard disk, DVD-ROM, or CD-ROM drive. A standard **Open Video File** dialog window will appear.

Navigation Panel

The Navigation panel appears automatically if a DVD is in the DVD-ROM drive and Autoplay is enabled. This panel includes eight DVD navigation buttons and a joystick controller.

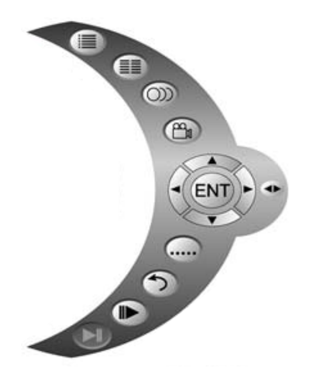


Figure 12. Navigation panel.

Click the *Menu Selector (Root Menu)* button while a DVD is playing to activate the DVD-based menu structure, if available. For example, some discs allow you to access multiple language soundtracks, multiple camera angles, and subtitle options using the DVD menu.

Click the *Title Selector (Title Menu)* button while a DVD is playing to activate the Title menu of a DVD, if available. Use the on-screen joystick (see Joystick Controller, Figure 13) to choose a title. Click *Select* or *Play* to play the title.

Left-click the *Audio Soundtrack Selector (Language)* button to choose from available soundtracks on a DVD movie disc. Select the desired language while a movie is playing. The selected language briefly appears in the upper-right corner of the movie screen. *Right-click this button to bring up a menu of available audio soundtrack options.*

Left-click the *Camera Angle Selector (Angle)* button and move the mouse up or down to choose from available camera angles on a DVD movie disc while the movie is playing. Left-click on the angle you wish to view. The camera angle ID number briefly appears in the upper-right corner of the movie screen. *Right-click this button to bring up a menu of available camera angle options.*

Left-click the *Subtitle Selector (Subtitle)* button to choose from available subtitles/closed caption options on a DVD movie disc. Select the desired language while a movie is playing. The selected language briefly appears in the upper-right corner of the movie screen. *Right-click this button to bring up a menu of available subtitle options.*

If the selector is divided (the languages appear more than once), the first selection provides normal subtitles for the selected language. The second language selection identifies subtitles with extra functions.

Left-click the *Slow Motion Play (Slow)* button to toggle the playback speed between normal speed, half speed (SLOW 2x), quarter speed (SLOW 4x), and eighth speed (SLOW 8x). Audio is muted in this mode. *Right-click this button to bring up a menu of available slow-motion options.* This button is active in DVD mode only.

Left-click the *Repeat Mode (Repeat)* button when playing a DVD to toggle between normal play, repeating the current chapter, and repeating the entire DVD. When playing a file from a play list, this button toggles between normal play, repeating the current file, and repeating the entire play list. *Right-click this button to bring up a menu of available repeat modes. For DVDs, available modes are Off, Repeat Chapter, and Repeat Title. For files, available modes are Off, Repeat List, Repeat File.*

Left-click the *Frame Advance (Step Frame)* button to advance the movie frame by frame. This button is currently grayed out, indicating that the functionality is disabled until a future release. When active, this button will function only in DVD mode.

Use the *Joystick Controller* to navigate through possible choices offered in DVD menus. Once a menu is visible, click on the *up, down, left, or right arrows* to highlight the option you wish to select, and then click on the *ENT* button in the center of the joystick to select the highlighted item.

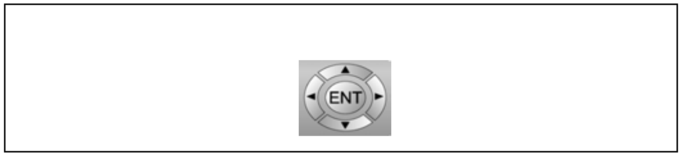


Figure 13. Joystick controller.

Keypad Panel

The Keypad panel appears if a VCD 2.0 is in the DVD/VCD-ROM drive. You can also force the Keypad panel to be displayed by pressing the keypad button on the Advanced panel (26). The Keypad panel includes a full 10-digit keypad, title/chapter display, and four control buttons.

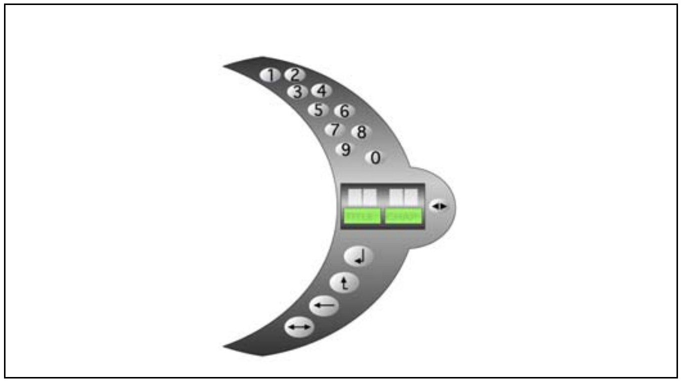


Figure 14. Keypad panel.

Click the *Execute* button to activate a chosen option.

Click the *Previous Menu* button to return to the previous menu.

Click the *Backspace* button to make input corrections.

Click the *Select* button to toggle between title and chapter field entry using the keypad.

Advanced Panel

The Advanced panel appears when the Advanced Panel button is clicked. An Advanced Panel button is present on both the Navigation and the Keypad panels. This panel includes six control buttons.

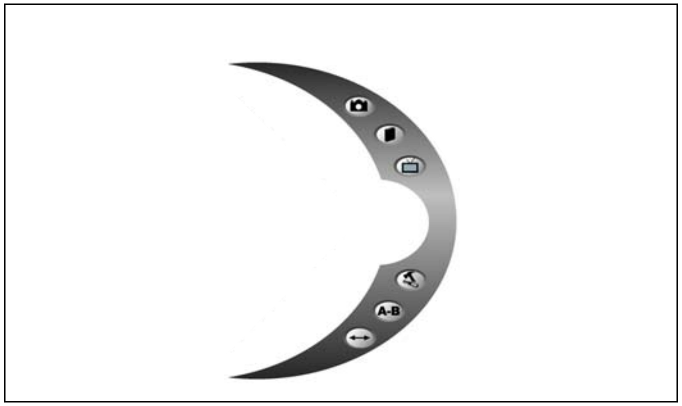


Figure 15. Advanced panel.

Click the *Capture* button to save a BMP image of a movie frame to disk. Due to copyright restrictions, this feature may not work with all DVD video titles.

Click the *Bookmark* button to remember pointers to moments within a track. This button is currently grayed out, indicating that the functionality is disabled until a future release.

Left-click the *Video Options (TV Out)* button to toggle between TV and windowed VGA modes. *Right-click this button for a video standards menu.*

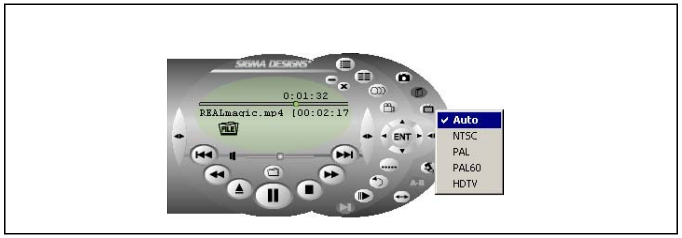


Figure 16. Video standards menu.

Click the *Configuration* button to bring up the configuration window. Refer to the Configuration Window section below to adjust settings for DVD setup, video setup, video adjustment, audio setup, and general options.

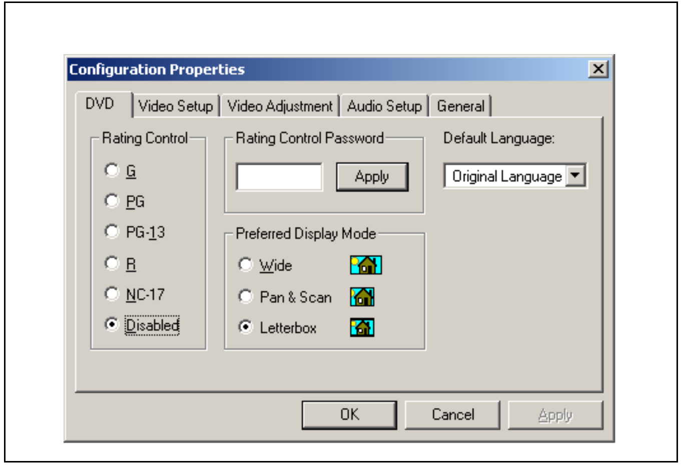
Click the *Segment Play* button to create custom movie loops. Click once during movie playback to set a start point and a second time to set an end point. Markers will appear on the progress bar to indicate the segment start and end points. The movie will loop between the two points until any other button is pressed.

Click the *Keypad Panel* button to bring up the floating 10-key keypad panel that allows interaction with DVD/VCD movies that have menu selections and other options.

Configuration Window

DVD options

Click on the DVD tab to display Xmedia player's DVD settings.



Configuration Properties

DVD | Video Setup | Video Adjustment | Audio Setup | General

Rating Control
○ G
○ PG
○ PG-13
○ R
○ NC-17
● Disabled

Rating Control Password: Apply

Default Language: Original Language

Preferred Display Mode
○ Wide
○ Pan & Scan
● Letterbox

OK Cancel Apply

Figure 17. DVD configuration dialog window.

Rating Control: The DVD format supports a voluntary movie rating system. With a rated title, this feature allows you to play an edited version of the movie, with objectionable scenes removed. For example, a title may come with R, PG-13, and PG-rated versions of the same movie.

To change the rating level:

1. Click in the password box, type in a password, and then Click the *Apply* button. Note that passwords are case sensitive.
2. Click on the rating level that the Xmedia player should not exceed and Click OK.

This Rating Control feature only works for DVD titles that support rating control. Some DVD movie titles may not use this voluntary rating system. You cannot rely upon this feature to prevent your children from viewing objectionable titles. The only way to prevent children from playing such movies is to physically keep those movies away from children.

Preferred Display Modes: Enable any of the following display modes by clicking on the appropriate radio button.

- Wide -- Enables 16:9 widescreen format display.
- Pan and Scan -- Enables 16:9 source to be displayed in 4:3, with the picture trimmed on the left and right sides. Some image crop will occur.
- Letterbox -- Enables 16:9 source to be displayed in 4:3, with black bars placed above and below the picture. No data loss occurs.

Video setup

Click on the Video Setup tab to display Xmedia player's video settings.

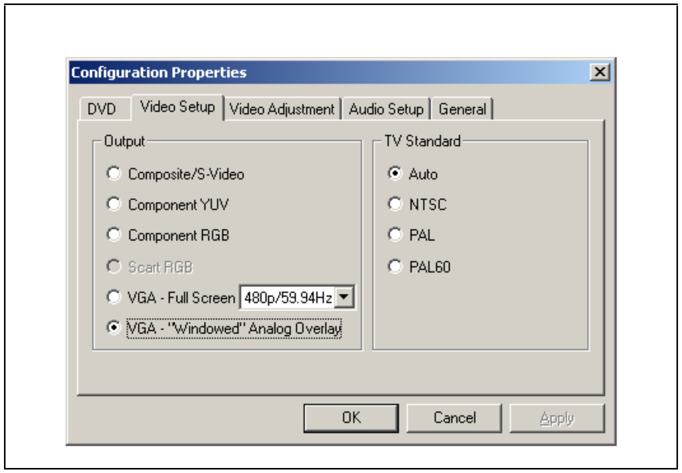


Figure 18. Video configuration setup.

Video Standards: Provides options for NTSC, PAL, PAL 60Hz, and Auto (Multisystem) output to TV. The Auto setting preserves the source format when sending a signal to the TV. The three remaining settings indicate the signal format sent to the TV, regardless of the original source format; the NetStream 4000 converts the source signal to the specified format, if necessary. Supported HDTV output formats delivered to the

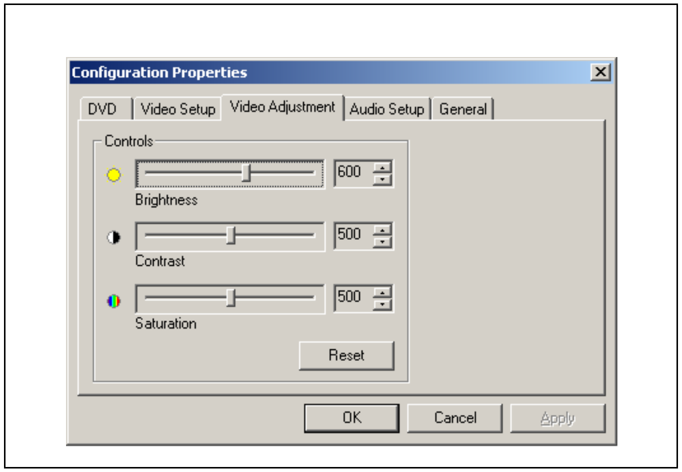
VGA monitor or an HDTV via the HDB-15 connector include 480p(60 Hz), 720p(60 Hz), and 1080i(60 Hz).

Video Outputs: Provides options for composite/S-Video, component YPbPr, component RGB, VGA fullscreen settings, and VGA windowed analog overlay. Choose the correct setting for your TV or VGA monitor.

If VGA fullscreen is selected, the Xmedia player and Windows desktop disappear as video is sent to the VGA monitor in fullscreen mode. To return to the Windows desktop, doubleclick the mouse or press the ESC key on your keyboard.

Video adjustment

Click the Video Adjustment tab to adjust the brightness, contrast, and color saturation of the movie.



Brightness 600

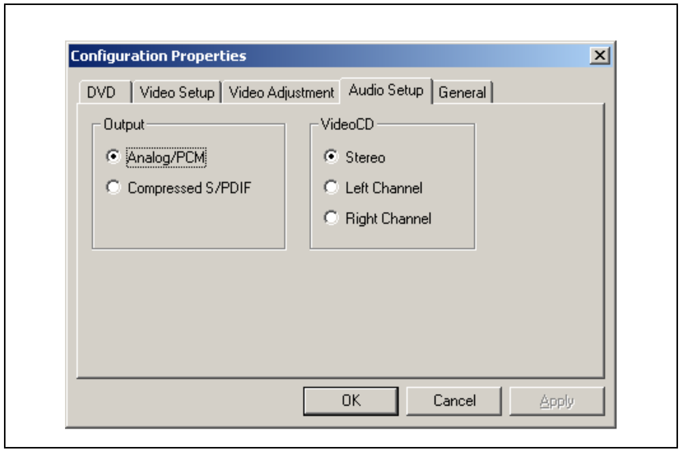
Contrast 500

Saturation 500

Figure 19. Video configuration adjustment dialog.

Reducing saturation to zero results in black and white TV output. All adjustments made from this dialog affect the current display mode, i.e., if the TV is currently selected, settings will impact the TV display; if VGA is selected, settings will impact the VGA display. Two sets of values are saved -- one for each video display.

Audio Output



Output
● Analog/PCM
○ Compressed S/PDIF

VideoCD
● Stereo
○ Left Channel
○ Right Channel

Figure 20. Audio setup window.

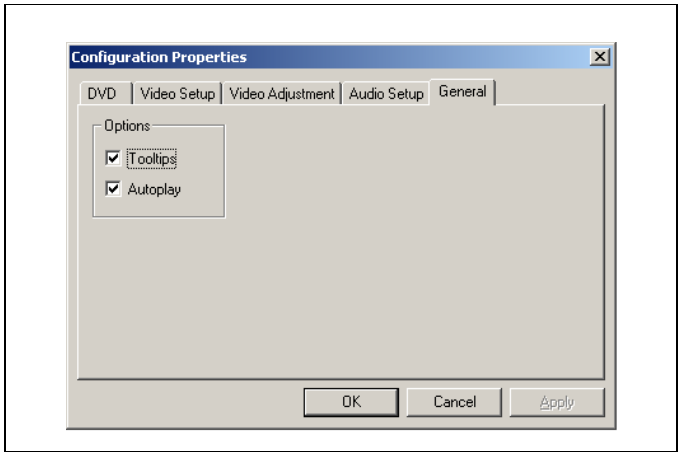
Analog/PCM: Enables Dolby Pro Logic Surround Sound output through the Line Out port. Choose this option to have the NetStream 4000 decode audio signals.

Compressed S/PDIF: Enables Dolby Digital Surround Sound or Digital Theater System sound through the S/PDIF port. Choose this option when an external device performs audio decoding. DTS streams are always delivered through the S/PDIF output.

VCD channel output: Use these controls for Karaoke or audio channel manipulation. Selecting ***Left*** outputs the left audio channel only to both left and right speakers. Selecting ***Right*** outputs the right audio channel only to both left and right speakers. Select***Stereo*** for normal stereo audio output.

General Settings

Click on the General tab to toggle general Xmedia player settings.



Options
☑ Tooltips
☑ Autoplay

Figure 21. General configuration dialog.

Tooltips: Enables pop-up Tooltips to explain Xmedia player button functions.

AutoPlay: Toggles between enabling/disabling AutoPlay.

Shortcut Keys

Key	Description
F1	Help (currently nonfunctional)
Alt-F4	Quit
Ctrl+e	Eject disk (open/close disk tray)
Ctrl+f	Fast-forward (cycles through 2x, 4x, 8x, normal)
Ctrl+m	Display DVD menu
Ctrl+n	Next track or chapter
Ctrl+p	Play/pause toggle
Ctrl+r	Rewind (cycles through 2x, 4x, 8x, normal)
Ctrl+s	Stop
Ctrl+t	Display DVD title menu
Ctrl+v	Previous track or chapter
Ctrl+w	Slow motion playback (cycles through 2x, 4x, 8x, normal)
ESC	Return to Windows desktop from fullscreen VGA display

DVD Menu Shortcut Keys

Key	Description
↑ ← → ↓	Select menu option (active when DVD menu is on-screen)
<Enter>	Activate selection (active when DVD menu is on-screen)

Chapter 6: Windows Media Player and DirectShow Support

The NetStream 4000 fully supports the Windows Media Player and DirectShow. The Windows Media Player application plays a variety of digital video, animation and audio files -- including MPEG-1, MPEG-2, and MPEG-4 video -- by using a mechanism called DirectShow. The Windows Media Player can run as a standalone application, or it can be embedded as an ActiveX control, and used inside of web pages or other Windows programs. Windows Media Player may be set to use the NetStream 4000 to play back MPEG-1, MPEG-2, and MPEG-4 files on your computer.

Windows Media Player and DirectShow work in all 32-bit versions of Windows, including Windows 98SE, Me, 2000 and XP. For best results, you should download and install the newest version of Windows Media Player from the Microsoft website. To do this, visit www.microsoft.com, click "Search" and enter the phrase "Windows Media Player." This will lead you to the download pages, as well as other pages which describe how to write HTML, Visual Basic and C programs which can control the Windows Media Player.

Note: Some versions of Windows, such as Windows 98SE, Me, 2000 and XP, may have been shipped with an outdated Media Player. For this reason, you should always download and install the latest version of the Windows Media Player from the Microsoft website.

DirectShow and the Windows Media Player are used with the NetStream 4000 to support streaming video playback from video server products from many companies. For a detailed compatibility list, please visit us on the web at www.sigmadesigns.com. Each NetStream 4000 video server product has its own unique client software. This client software is available from the company which makes the video server.

Streaming MPEG video over a network is accomplished using many different types of techniques, which have different advantages, depending upon what goals you are trying to accomplish. The design of a streaming video server for 10,000 simultaneous users is different than a video server for 50 users. In addition, playing MPEG over a network can make substantial drains on the network's resources, which might require upgrading. Because MPEG video may consume 1 to 8 Mbits per second of sustained bandwidth, it is easy to saturate a 100 Mbit/sec (100BaseT) network. Using high quality network adapters and Ethernet switches is essential for good streaming video.

One technique which reduces the strain on the network is called "multicasting." Instead of each person on the network watching his own video stream, every person can watch the same stream, as if it were a TV broadcast. This reduces the strain on the network considerably, even if 5 or 10 channels are available. This technique can be used with either stored or live video feeds, and can also be used to combine live and stored video together.

Sigma Designs works with many partner companies to provide highly dependable streaming video solutions of all kinds. These partners are experts at digital video and network design and can help to create a solution perfectly suited for your needs.

Software development documents are available from Sigma Designs for programmers wishing to create their own streaming and interactive video products. The Sigma Designs tool kit is based on DirectShow, but uses Sigma-developed filters and special function calls to offer additional functionality not available in the standard Microsoft DirectShow release. For information on these software development tool kits, send e-mail to sales@sigmadesigns.com.

Chapter 7: Advanced Configuration Options

Manual Color Calibration

If the Auto calibration feature displays an error message, follow the steps below to manually calibrate the color:

1. From the **REALmagic Configuration…** dialog (refer to Figure 3), click **Advanced >>>** and then **Manual calibration**.
2. From the **Dialog** (Figure 26), use your mouse to move the bar (marked R) slowly up or down to a point where the image of the big box on the right-hand side of the Dialog window appears similar to the image of the "GOOD" box. You can use the UP or DOWN arrow keys on the keyboard to make fine adjustments. Click Next. You must perform this procedure three more times for the colors red, green, and blue. After the last adjustment, click **OK**.

Advanced Color Adjustments

When you move the mouse or a window on top of the DVD or MPEG video, the VGAgraphics need to appear on top of the video window. To do this, the DVD/MPEG-1,-2,-4 Playback Card uses a well established method called chroma key. This method is similar to the "blue-screen" effect often used in television. A special color is chosen as the "chroma key" color, and video will only display where the chroma key color appears. For practical reasons, the chroma key color is usually a rarely used color that is very unlikely to be used by other Windows programs.

The DVD/MPEG-1,-2,-4 Playback Card software defaults to a dark green color as the chroma key color. You might prefer to use a different color if the default color conflicts with one of your application programs.

When there is a conflict, you will see MPEG video displayed "through" an area of you application. There may also be instances where the default color is not compatible with your VGA display.

Follow the steps below to set your own chroma key color if:

- You want to use a different chroma key color, or
- You are not able to view any MPEG video on your VGA screen, or
- If the VGAgraphics seems to "bleed through" the MPEG video

1. Start DVD Station and play an MPEG video. Even if the video is not visible, you should be able to hear the audio.
2. Click on the **Options** button, click on the **Settings** tab, and then click the Configure button. Next, click the **Advance>>>** button and select **Color Adjustment.**
3. Select a key color from the **Choose key color to set** menu.

Note: If you are not able to view MPEG video at all, there are several things you should try before changing the chroma key color: make sure that the monitor is connected to the DVD/MPEG-1,-2,-4 Playback Card, powering off the computer and try again after restarting, or double check the Border Adjust and Color Calibration procedures.

4. If you would like to select a key color that is not in the menu, select **Add Custom Color**, which is the last item on the menu. This will bring up a dialog box that allows you to enter the red (R), green (G), and blue (B) values of the color you want. There are 256 levels for each color. Enter a value between 0 and 255.
5. MPEG video should appear in the border surrounding the color chart. There should also be a "hole" in the color chart where MPEG video will show through.
6. If MPEG video does not appear in BOTH the border and the "hole," then you must adjust the R, G, and B values with the sliders until you can see the video in both regions. Do this by adjusting the width (W) and length (L) slider bars of each color to make the video appear both inside and outside of the color chart. Normally, adjusting these sliders can easily make a very large hole in the color chart that displays MPEG video. Once you can see video in both the inside and the outside area, you should adjust the sliders to reduce the size of the hole so that it is about 40 x 40 pixels, which is roughly the size of a Windows icon. Making the hole too small will cause video "jittering" and "bleeding." Making the hole too large will cause MPEG video to play "through" areas within a larger range around the chroma key color.
7. If necessary, click the **Reset Key Color Defaults** button to reset the key color back to the factory default value.
8. Click **OK** to exit the **Key Color Settings** window.

Border Adjustments

Follow the steps below to fine-tune the position and size of the MPEG video within its display window.

9. From the **REALmagic Configuration...** dialog (refer to Figure 5) click **Advanced >>>** and then **Border Adjust**. In the resulting dialog box, click the **Expert** button.
10. In the **Expert Settings** dialog (Figure 27, the four **Cropping** region values crop the MPEG video image from the Left, Right, Top, and Bottom. This allows you to position the video with greater precision. The **Stability** value delays the display of video pixels merged with video graphics. Adjusting these values can reduce flutter and jitter which may appear with display adapter and resolution combinations.

Chapter 8: Customer Service

If you encounter problems installing or using your REALmagic NetStream 4000 MPEG-2 Playback Card, contact your dealer. If you need additional assistance, Sigma Designs has a full-time Customer Service staff available to assist you over the telephone, by FAX, or via the Internet.

Customer Service Hours: M-F, 8:00 A.M. to 5:00 P.M. (Pacific Time).

Telephone Number: (408) 957-9866

FAX: (408) 957-9740

Email: tech_support@sdesigns.com

World Wide Web: www.sigmadesigns.com

Appendix

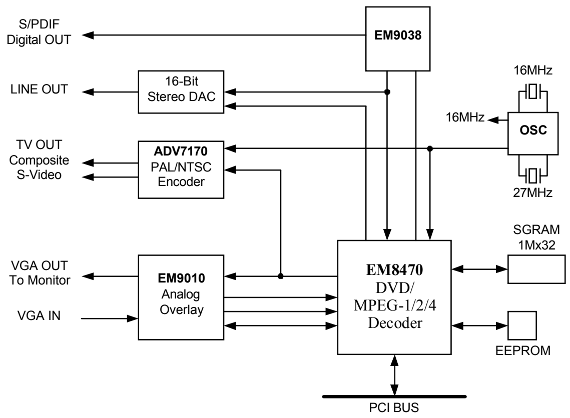


Figure 22. NetStream 4000 block diagram.

Output specifications

Audio

Xmedia player provides both PCM and analog output. Audio output levels from the mini-jack are variable, with 10K ohms impedance (typical). Audio output levels via S/PDIF are 0.5Vpp, with 75 ohms impedance (typical).

The frequency response for the NetStream 4000 is -3 dB from 20Hz to 20KHz.

Video

Xmedia player defaults to a windowed VGA output. Use the DB15 output from the NetStream 4000 to deliver video to VGA monitors and some TVs. In some cases, fullscreen mode using the DB15 connection produces a higher quality output. For progressive output, use the D-SUB connector, not the component adapter.

TV and analog overlay (windowed video) output cannot be output simultaneously.

Video output level from S-Video (@NTSC Full Screen signal): 1.23 Vp

For a list of currently supported video servers, visit www.sigmadesigns.com.

Power specifications

Power consumption is less than 5W.

Voltage (DC)	Power consumption (mA)
+5	580 typical[1] (VGA mode) 820 typical (TV mode)
+12	130 typical
-12	not used

[1] Typical power requirements are equivalent to maximum requirements.

SIGMA DESIGNS®

Sigma Designs, Incorporated
1221 California Circle • Milpitas, CA 95035-3024
Tel: (408) 262-9003 • Fax: (408) 957-9740
http://www.sigmadesigns.com

Customer Service NS004-A-007